



INVESTOR IN PEOPLE

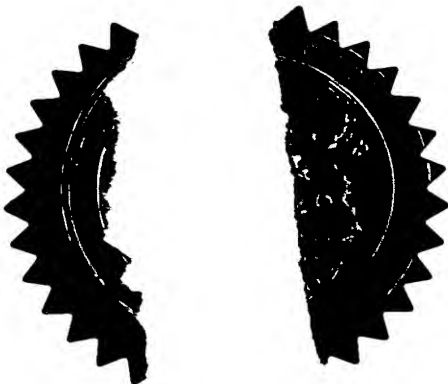
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Statement of inventorship and
of right to grant of a patent

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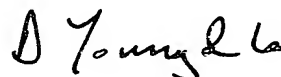
1. Your reference	P008793GB
2. Patent application number (if you know it)	0008407.9
3. Full name of the or of each applicant	SONY UNITED KINGDOM-LIMITED
4. Title of the invention	VIDEO RECORDING

5. State how the applicant(s) derived the right from the inventor(s) to be granted a patent	BY VIRTUE OF AN ASSIGNMENT DATED 3 NOVEMBER 2000 BETWEEN OURSELVES AND THE OVERNAMED INVENTOR
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6. How many, if any, additional Patents Forms 7/77 are attached to this form? (see note (c))

7. I/We believe that the person(s) named over the page (and on any extra copies of this forms) is/are the inventor(s) of the invention which the above patent relates to.

Signature Date



D YOUNG & CO
Agents for the Applicants

6 Nov 2000

8. Name and daytime telephone number of person to contact in the United Kingdom	023 80634816	James Turner
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Notes

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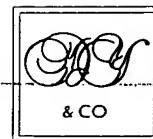
Enter the full names, addresses and
postcodes of the inventors in the boxes
and underline the surnames

Surname	<u>DAVID</u>
First Names	Morgan William Amos
Address	18 Broomleaf Road Farnham Surrey, GU9 8DG United Kingdom
Patents ADP number (if you know it): 06227342001	

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The Patent Office

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1. Your reference

P/8793 GB

2. Patent application

(The Patent Office will ...)

0008407.9

5 APR 2000

3. Full name, address and postcode of the or of each applicant
(underline all surnames)

SONY UNITED KINGDOM LIMITED
THE HEIGHTS
BROOKLANDS
WEYBRIDGE
SURREY, KT13 0XW

Patents ADP number (if you know it)

If the applicant is a corporate body, give the country/state of its incorporation

UNITED KINGDOM

6522700001

4. Title of the invention

VIDEO RECORDING

5. Name of your agent (if you have one)

D YOUNG & CO

"Address for service" in the United Kingdom to which all correspondence should be sent
(including the postcode)

21 NEW FETTER LANE
LONDON
EC4A 1DA

Patents ADP number (if you have one)

59006

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Country

Priority application
number
(if you know it)

Date of filing
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application

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a) any applicant named in part 3 is not an inventor, or
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Continuation sheets of this form 0

Description 13

Claims(s) 2

Abstract 1

Drawing(s) 4 + 16

10. If you are also filing any of the following, state how many against each item.

Priority documents 0

Translations of priority documents 0

Statement of inventorship and right to grant of a patent (Patents Form 7/77) 0

Request for preliminary examination and search (Patents Form 9/77) 1

Request for substantive examination (Patents Form 10/77) 0

Any other documents (please specify) 0

11.

I/We request the grant of a patent on the basis of this application.

Signature

Date

D Young & Co

05 04 00

D YOUNG & CO

Agents for the Applicants

12. Name and daytime telephone number of the person to contact in the United Kingdom

J A TURNER

(02380)

634816

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DUPLICATE

VIDEO RECORDING

This invention relates to video recording.

As one example of video recording, several formats of digital video tape have
5 been proposed. The first commercially successful format was the so-called "D1" format,
described in the book, "Introduction to the 4:2:2 Digital Video Tape Recorder", Gregory,
Pentech Press, 1988. Since then there have been many other formats, either standardised
or proprietary.

A feature that these formats have in common is the use of helical scanning. This
10 is a well-established technique in which the tape medium is wrapped at least part of the
way around a head drum. One or more rotating read/write heads, mounted on the head
drum, sweep out successive slant tracks on the tape medium as the medium is progressed
slowly past the head drum. Slant tracks may carry a timecode known in some systems as
Vertical Interval Timecode (VITC). Linear tracks may also be used to carry information
15 such as Linear Timecode (LTC), other control information, a cueing audio track and the
like.

Each slant track is generally divided up into a number of regions or sectors.
Although the precise number and layout of these regions varies from format to format,
there are generally one or more video sectors and one or more audio sectors on each slant
20 track. These can store compressed or uncompressed video and audio data. In other
systems, data representing each video frame or image, or a group of images, may be
recorded onto a group of tracks.

Recently, interest has developed in ways of recording so-called metadata along-
with the audio and video material. Metadata is additional or accompanying data defining
25 the audio/video material in some fashion, and can include data items such as material
identifying codes (e.g. the SMPTE Unique Material Identifier or UMID), bibliographic
data such as cast or staff lists, copyright information, equipment used and so on. Of
course, if any such codes are to be stored alongside the audio/video material on tape,
some data capacity needs to be allocated for its storage.

30 One previously proposed solution is to store "small" metadata items such as
material identifiers using the "user bits", that is a small amount of user-definable data
within the LTC areas of the tape. Typically the user bits provide only of the order of 4
bytes (32 bits) per frame, of which some capacity is taken up by existing schemes such as

"good shot markers" (GSMs). As an SMPTE UMID occupies at least 32 bytes, and in some forms up to 64 bytes, this solution provides for only a limited storage of this data.

This invention provides a video recorder operable to record video and audio material together with a timecode having a plurality of user-definable data bits;

5 the video recorder being operable to store a material identifying code in a subset of the user-definable bits of the timecode so that each instance of the material identifying code extends over the timecode user bits corresponding to an ordered sequence of more than one frame of the video material, the recorder also recording in a further subset of the user-definable bits of the timecode for each frame a sequence position indicator,
10 indicative of the position of the current frame in the ordered sequence.

The invention recognises that previous attempts to store metadata along with the audio/video material, for example on tape, have suffered from the limitation that the LTC user bits do not provide sufficient data capacity to store the whole of, say, an SMPTE extended UMID, particularly when existing uses of the user bits such as GSMs are taken
15 into account.

Accordingly, the material identifying code is split over several frames, and a position indicator is included so that the position of a current frame's LTC user bits in the sequence can be established.

This can be particularly useful in the case of a standard format material identifying
20 code such as an SMPTE UMID, in which the order of information items within the UMID is predetermined. Accordingly, if replay starts part way through the sequence, useful data can still be extracted even before the next complete instance of the UMID is recovered.

Although the invention is suited to other recording media such as disk media, it is preferred that the recorder is a tape recorder operable to record video and audio material
25 in successive slant tracks and at least one linear track on a tape medium, the linear track storing a linear track timecode having a plurality of user-definable data bits. In this case, it is particularly convenient if the material identifying code and the sequence position indicator are stored in respective subsets of the user-definable bits of the linear track timecode.

30 It is preferred that the material identifying code is a code which uniquely defines the material amongst other material items stored on the same medium. In particular preferred embodiments the material identifying code is an SMPTE UMID.

Further respective aspects and features of the invention are defined in the appended claims.

Embodiments of the invention will now be described with reference to the accompanying drawings, throughout which like parts are referred to by like references, and in which:

Figure 1 schematically illustrates a known tape format;

5 Figure 2 schematically illustrates a time code;

Figure 3 schematically illustrates a digital camcorder;

Figure 4 schematically illustrates a metadata structure; and

Figure 5 schematically illustrates the recording of material-identifying metadata onto a video time code.

10 Referring to Figure 1, a tape format is shown schematically. Video and audio information is recorded in helical tracks of which a set of, e.g. 10 or 12, tracks records one field of video. The helical tracks include vertical interval time codes (VITC). The time codes may be duplicated in a linear time code track LTC, but the contents of the VITC and LTC may be different. The tape may comprise at least one other linear track (not
15 shown). In this illustrative description it is assumed that all video, audio and other information is recorded digitally. However, the video and audio may be recorded as analogue information. The video and audio information may be compressed according to the MPEG 2 standard for example.

The time codes are recorded once per video field. As schematically shown, in
20 Figure 2, a known time code has 80 bits of which 16 are reserved for synchronisation information, 32 for time code bits and 32 for user defined bits, herein referred to as "user bits". The user bits are interleaved with the other bits in a typical time code; however the invention is not limited to that.

Tape IDs and UMIDs

25 SMPTE UMIDs are material identifiers which are universally unique. In embodiments of the present invention they are used to bind material i.e. video and/or audio recorded on the tape to metadata which is stored in for example a database 464 as shown in Figure 3.

A UMID is described in reference [2]. An extended UMID comprises a first set of
30 32 bytes of basic UMID and a second set of 32 bytes of signature metadata.

The first set of 32 bytes is the basic UMID. The components are:

- A 12-byte Universal Label to identify this as a SMPTE UMID. It defines the type of material which the UMID identifies and also defines the methods by which the globally unique Material and locally unique Instance numbers are created.

- A 1-byte length value to define the length of the remaining part of the UMID.
- A 3-byte Instance number which is used to distinguish between different 'instances' of material with the same Material number.
- A 16-byte Material number which is used to identify each clip. Each Material number is the same for related instances of the same material.

The second set of 32 bytes of the signature metadata as a set of packed metadata items used to create an extended UMID. The extended UMID comprises the basic UMID followed immediately by signature metadata which comprises:

- An 8-byte time/date code identifying the time and date of the Content Unit creation.

- A 12-byte value which defines the spatial co-ordinates at the time of Content Unit creation.

- 3 groups of 4-byte codes which register the country, organisation and user codes
- Each component of the basic and extended UMIDs will now be defined in turn.

The 12-byte Universal Label

The first 12 bytes of the UMID provide identification of the UMID by the registered string value defined in table 1.

Byte No.	Description	Value (hex)
1	Object Identifier	06h
2	Label size	0Ch
3	Designation: ISO	2Bh
4	Designation: SMPTE	34h
5	Registry: Dictionaries	01h
6	Registry: Metadata Dictionaries	01h
7	Standard: Dictionary Number	01h
8	Version number	01h
9	Class: Identification and location	01h
10	Sub-class: Globally Unique Identifiers	01h
11	Type: UMID (Picture, Audio, Data, Group)	01, 02, 03, 04h
12	Type: Number creation method	XXh

Table 1: Specification of the UMID Universal Label

The hex values in table 1 may be changed: the values given are examples. Also the bytes 1-12 may have designations other than those shown by way of example in the table. Referring to the Table 1, in the example shown byte 4 indicates that bytes 5-12 relate to a data format agreed by SMPTE. Byte 5 indicates that bytes 6 to 10 relate to "dictionary" data. Byte 6 indicates that such data is "metadata" defined by bytes 7 to 10. Byte 7 indicates the part of the dictionary containing metadata defined by bytes 9 and 10. Byte 10 indicates the version of the dictionary. Byte 9 indicates the class of data and Byte 10 indicates a particular item in the class.

In the present embodiment bytes 1 to 10 have fixed preassigned values. Byte 11 is variable. Thus referring to Figure 5, and to Table 1 above, it will be noted that the bytes 1 to 10 of the label of the UMID are fixed. Therefore they may be replaced by a 1 byte 'Type' code T representing the bytes 1 to 10. The type code T is followed by a length code L. That is followed by 2 bytes, one of which is byte 11 of Table 1 and the other of which is byte 12 of Table 1, an instance number (3 bytes) and a material number (16 bytes). Optionally the material number may be followed by the signature metadata of the extended UMID and/or other metadata.

The UMID type (byte 11) has 4 separate values to identify each of 4 different data types as follows:

- '01h' = UMID for Picture material
- '02h' = UMID for Audio material
- '03h' = UMID for Data material
- '04h' = UMID for Group material (i.e. a combination of related essence).

The last (12th) byte of the 12 byte label identifies the methods by which the material and instance numbers are created. This byte is divided into top and bottom nibbles where the top nibble defines the method of Material number creation and the bottom nibble defines the method of Instance number creation.

Length

The Length is a 1-byte number with the value '13h' for basic UMIDs and '33h' for extended UMIDs.

Instance Number

The Instance number is a unique 3-byte number which is created by one of several means defined by the standard. It provides the link between a particular 'instance' of a clip and externally associated metadata. Without this instance number, all material could be linked to any instance of the material and its associated metadata.

The creation of a new clip requires the creation of a new Material number together with a zero Instance number. Therefore, a non-zero Instance number indicates that the associated clip is not the source material. An Instance number is primarily used to identify associated metadata related to any particular instance of a clip.

5 **Material Number**

The 16-byte Material number is a non-zero number created by one of several means identified in the standard. The number is dependent on a 6-byte registered port ID number, time and a random number generator.

Signature Metadata

10 Any component from the signature metadata may be null-filled where no meaningful value can be entered. Any null-filled component is wholly null-filled to clearly indicate a downstream decoder that the component is not valid.

The Time-Date Format

The date-time format is 8 bytes where the first 4 bytes are a UTC (Universal Time
15 Code) based time component. The time is defined either by an AES3 32-bit audio sample clock or SMPTE 12M depending on the essence type.

The second 4 bytes define the date based on the Modified Julian Data (MJD) as defined in SMPTE 309M. This counts up to 999,999 days after midnight on the 17th
November 1858 and allows dates to the year 4597.

20 **The Spatial Co-ordinate Format**

The spatial co-ordinate value consists of three components defined as follows:

- Altitude: 8 decimal numbers specifying up to 99,999,999 metres.
- Longitude: 8 decimal numbers specifying East/West 180.00000 degrees (5
25 decimal places active).
- Latitude: 8 decimal numbers specifying North/South 90.00000 degrees (5
30 decimal places active).

The Altitude value is expressed as a value in metres from the centre of the earth thus allowing altitudes below the sea level.

It should be noted that although spatial co-ordinates are static for most clips, this is
30 not true for all cases. Material captured from a moving source such as a camera mounted on a vehicle may show changing spatial co-ordinate values.

Country Code

The Country code is an abbreviated 4-byte alpha-numeric string according to the set defined in ISO 3166. Countries which are not registered can obtain a registered alpha-numeric string from the SMPTE Registration Authority.

Organisation Code

5 The Organisation code is an abbreviated 4-byte alpha-numeric string registered with SMPTE. Organisation codes have meaning only in relation to their registered Country code so that Organisation codes can have the same value in different countries.

User Code

10 The User code is a 4-byte alpha-numeric string assigned locally by each organisation and is not globally registered. User codes are defined in relation to their registered Organisation and Country codes so that User codes may have the same value in different organisations and countries.

Freelance Operators

15 Freelance operators may use their country of domicile for the country code and use the Organisation and User codes concatenated to e.g. an 8 byte code which can be registered with SMPTE. These freelance codes may start with the '~' symbol (ISO 8859 character number 7Eh) and followed by a registered 7 digit alphanumeric string.

Linking to a database

20 It is desirable to provide more detailed metadata relating to the material recorded on the tape. Examples of appropriate metadata are given below. Thus metadata is stored in a database, the UMID linking the metadata to the material.

The following is provided, by way of example, to illustrate the possible types of metadata generated during the production of a programme, and one possible organisational approach to structuring that metadata.

25 Figure 4 schematically illustrates an example structure for organising metadata. A number of tables each comprising a number of fields containing metadata are provided. The tables may be associated with each other by way of common fields within the respective tables, thereby providing a relational structure. Also, the structure may comprise a number of instances of the same table to represent multiple instances of the
30 object that the table may represent. The fields may be formatted in a predetermined manner. The size of the fields may also be predetermined. Example sizes include "Int" which represents 2 bytes, "Long Int" which represents 4 bytes and "Double" which represents 8 bytes. Alternatively, the size of the fields may be defined with reference to

the number of characters to be held within the field such as, for example, 8, 10, 16, 32, 128, and 255 characters.

Turning to the structure in more detail, there is provided a Programme Table. The Programme Table comprises a number of fields including Programme ID (PID), Title, Working Title, Genre ID, Synopsis, Aspect Ratio, Director ID and Picture stamp. Associated with the Programme Table is a Genre Table, a Keywords Table, a Script Table, a People Table, a Schedule Table and a plurality of Media Object Tables.

The Genre Table comprises a number of fields including Genre ID, which is associated with the Genre ID field of the Programme Table, and Genre Description.

The Keywords Table comprises a number of fields including Programme ID, which is associated with the Programme ID field of the Programme Table, Keyword ID and Keyword.

The Script Table comprises a number of fields including Script ID, Script Name, Script Type, Document Format, Path, Creation Date, Original Author, Version, Last Modified, Modified By, PID associated with Programme ID and Notes. The People Table comprises a number of fields including Image.

The People Table is associated with a number of Individual Tables and a number of Group Tables. Each Individual Table comprises a number of fields including Image. Each Group Table comprises a number of fields including Image. Each Individual Table is associated with either a Production Staff Table or a Cast Table.

The Production Staff Table comprises a number of fields including Production Staff ID, Surname, Firstname, Contract ID, Agent, Agency ID, E-mail, Address, Phone Number, Role ID, Notes, Allergies, DOB, National Insurance Number and Bank ID and Picture Stamp.

The Cast Table comprises a number of fields including Cast ID, Surname, Firstname, Character Name, Contract ID, Agent, Agency ID, Equity Number, E-mail, Address, Phone Number, DOB and Bank ID and Picture Stamp. Associated with the Production Staff Table and Cast Table are a Bank Details Table and an Agency Table.

The Bank Details Table comprises a number of fields including Bank ID, which is associated with the Bank ID field of the Production Staff Table and the Bank ID field of the Cast Table, Sort Code, Account Number and Account Name.

The Agency Table comprises a number of fields including Agency ID, which is associated with the Agency ID field of the Production Staff Table and the Agency ID field

the Cast Table, Name, Address, Phone Number, Web Site and E-mail and a Picture stamp. Also associated with the Production Staff Table is a Role Table.

The Role Table comprises a number of fields including Role ID, which is associated with the Role.ID field of the Production Staff Table, Function and Notes and a Picture Stamp. Each Group Table is associated with an Organisation Table.

The Organisation Table comprises a number fields including Organisation ID, Name, Type, Address, Contract ID, Contact Name, Contact Phone Number and Web Site and a Picture Stamp.

Each Media Object Table comprises a number of fields including Media Object ID, Name, Description, Picture stamp, PID, Format, schedule ID, script ID and Master ID. Associated with each Media Object Table is the People Table, a Master Table, a Schedule Table, a Storyboard Table, a script table and a number of Shot Tables.

The Master Table comprises a number of fields including Master ID, which is associated with the Master ID field of the Media Object Table, Title, Basic UMID, EDL ID, Tape ID and Duration and a Picture Stamp.

The Schedule Table comprises a number of fields including Schedule ID, Schedule Name, Document Format, Path, Creation Date, Original Author, Start Date, End Date, Version, Last Modified, Modified By and Notes and PID which is associated with the programme ID.

The contract table contains: a contract ID which is associated with the contract ID of the Production staff, cast, and organisation tables; commencement date, rate, job title, expiry date and details.

The Storyboard Table comprises a number of fields including Storyboard ID, which is associated with the Storyboard ID of the shot Table, Description, Author, Path and Media ID.

Each Shot Table comprises a number of fields including Shot ID, PID, Media ID, Title, Location ID, Notes, Picture stamp, script ID, schedule ID, and description. Associated with each Shot Table is the People Table, the Schedule Table, script table, a Location Table and a number of Take Tables.

The Location Table comprises a number of fields including Location ID, which is associated with the Location ID field of the Shot Table, GPS, Address, Description, Name, Cost Per Hour, Directions, Contact Name, Contact Address and Contact Phone Number and a Picture Stamp.

Each Take Table comprises a number of fields including Basic UMID, Take Number, Shot ID, Media ID, Timecode IN, Timecode OUT, Sign Metadata, Tape ID, Camera ID, Head Hours, Videographer, IN Stamp, OUT Stamp, Lens ID, AUTOID ingest ID and Notes. Associated with each Take Table is a Tape Table, a Task Table, a Camera Table, a lens table, an ingest table and a number of Take Annotation Tables.

The Ingest table contains an Ingest ID which is associated with the Ingest Id in the take table and a description.

The Tape Table comprises a number of fields including Tape ID, which is associated with the Tape ID field of the Take Table, PID, Format, Max Duration, First Usage, Max Erasures, Current Erasure, ETA (estimated time of arrival) and Last Erasure Date and a Picture Stamp.

The Task Table comprises a number of fields including Task ID, PID, Media ID, Shot ID, which are associated with the Media ID and Shot ID fields respectively of the Take Table, Title, Task Notes, Distribution List and CC List. Associated with the Task Table is a Planned Shot Table.

The Planned Shot Table comprises a number of fields including Planned Shot ID, PID, Media ID, Shot ID, which are associated with the PID, Media ID and Shot ID respectively of the Task Table, Director, Shot Title, Location, Notes, Description, Videographer, Due date, Programme title, media title Aspect Ratio and Format.

The Camera Table comprises a number of fields including Camera ID, which is associated with the Camera ID field of the Take Table, Manufacturer, Model, Format, Serial Number, Head Hours, Lens ID, Notes, Contact Name, Contact Address and Contact Phone Number and a Picture Stamp.

The Lens Table comprises a number of fields including Lens ID, which is associated with the Lens ID field of the Take Table, Manufacturer, Model, Serial Number, Contact Name, Contact Address and Contact Phone Number and a Picture Stamp.

Each Take Annotation Table comprises a number of fields including Take Annotation ID, Basic UMID, Timecode, Shutter Speed, Iris, Zoom, Gamma, Shot Marker ID, Filter Wheel, Detail and Gain. Associated with each Take Annotation Table is a Shot Marker Table.

The Shot Marker Table comprises a number of fields including Shot Marker ID, which is associated with the Shot Marker ID of the Take Annotation Table, and Description.

Illustrative System

Referring to Figure 3, a camcorder 460 comprises a video and audio pickup arrangement 462 (e.g. a CCD image pickup device and a microphone) outputting data audio (A) and video (V) data streams, a UMID generator 464, a multiplexer 466, a good shot marker (GSM) control button 467 and a tape recording arrangement 468.

The UMID generator can take many forms, and serves to generate UMIDs in accordance with the SMPTE standard. In the embodiment to be described, these are 32-byte UMIDs, but other forms of UMID could be generated. The techniques for storing the UMIDs on tape which will be described below are also applicable to material identifying codes other than UMIDs, such as locally unique or even tape-unique reference numbers.

The UMID generator in the present embodiment also has a signal processor (not shown) which may derive metadata from the camera and/or material recorded on the tape and store it or transfer it to an external data store. The UMID generator has a data entry device, for example a keyboard, to enter data and may have, or be connected to, a GPS device for producing (if required) the spatial co-ordinate data of an extended UMID.

Good shot markers are an established feature of many camcorders. A control 467 is provided for the cameraman to operate if he considers that a current shot or take has been successful. A data flag representing a GSM is recorded onto the tape in the time code user bits.

The UMID generated by the UMID generator is passed, with the video and audio data streams and the GSMs, to the multiplexer 466 for recording on the tape.

The multiplexer arranges the UMID data and the GSM flags (and any other such data) into the time code user bits. This could be either the LTC or the VITC or both, although for clarity of the diagram Figure 5 will refer only to the LTC user bits. These user bits are then passed to the tape transport in a conventional way for recording on the tape.

Figure 5 schematically illustrates the way in which the multiplexer 466 arranges the UMID and GSM data for recording in the timecode user bits.

At the top of Figure 5 is a schematic illustration of a tape medium 500 as recorded by the apparatus of Figure 3, showing successive instances of the LTC user bits 510. One such instance is shown in enlarged form at the bottom of Figure 5. As mentioned above,

the user bits are in fact interspersed with timecode bits, but for clarity of the diagram they are illustrated as a contiguous group.

The user bits contain a counter 520, the GSM data 530 and a part of the UMID 540.

As mentioned above, the maximum capacity of the LTC or VITC user bits in current tape formats is 32 bits per instance (i.e. per field), or 64 bits per frame. Clearly, even the smallest UMID in accordance with the SMPTE standard (32 bytes) will not fit into one or even a pair of instances of the TC user bits.

Accordingly, the multiplexer 466 divides the 32 byte UMID into 16 successive sections of 16 bits each and records them over 16 successive instances of the TC user bits, that is, 8 video frames. So, the part UMID 540 shown in Figure 5 is 16 bits, or half of the TC user bits. The UMID data can be shuffled and/or error corrected as required.

In order to enable a tape replay device to detect where the currently replayed field or frame is in the 16 field or 8 frame sequence used to record a UMID, the multiplexer 466 also provides the counter 520, which occupies no more than 1 byte (8 bits) of the user bits and defines the position within that sequence – for example as a number counting from 0 to 15 (or 0 to 7 for a frame count), then returning to 0 to indicate the start of the next sequence and so on. Clearly, four bits (for a 0 to 15 count) or 3 bits (for a 0 to 7 count) could be used. This leaves at least 8 bits (one byte) to store the GSM or other similar data.

The 32 byte UMID could also be shortened for the present purposes as follows. 12 bytes of the SMPTE UMID are, as described above, the SMPTE label. This includes 10 bytes of substantially static data. In embodiments of the invention, the label is replaced by a short code which can then be mapped back to the UMID label at replay or on later processing. This can shorten the amount of data needed to record the UMID by 10 bytes and allow space for other data such as CRC error correction codes.

Embodiments of the invention also extend to a tape replay device arranged to recover the UMID data by detecting the counter 520 in the TC user bits, and rebuilding the UMID from data recovered from the part UMID sections 540 by assembling those sections in the correct order. Such a device may be substantially as drawn in Figure 3, but with a demultiplexer performing the above operation in place of the multiplexer 466.

References

[1] Introduction to the 4:2:2 Digital Video Tape Recorder - Stephen Gregory
Pentech Press 1998, ISBN 0-7273-0903-X

5 [2] EBU/SMPTE Task Force for Harmonised Standards for the Exchange of
Programme Material as Bit Streams, Final Report: Analyses and Results, Sept 1998.

[3] EBU/IFTA Forum "Paving the Way to Future TV Archives", Vienna, 18
June 1999, M.F. Vetter, TASC Inc.

[4] MPEG2 - ISO/IEC/ 13818-2

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CLAIMS

1. A video recorder operable to record video and audio material together with a timecode having a plurality of user-definable data bits;
5 the video recorder being operable to store a material identifying code in a subset of the user-definable bits of the timecode so that each instance of the material identifying code extends over the timecode user bits corresponding to an ordered sequence of more than one frame of the video material, the recorder also recording in a further subset of the user-definable bits of the timecode for each frame a sequence position indicator,
10 indicative of the position of the current frame in the ordered sequence.
2. A video recorder according to claim 1, the recorder being a tape recorder operable to record video and audio material in successive slant tracks and at least one linear track on a tape medium, the linear track storing a linear track timecode having a plurality of
15 user-definable data bits.
3. A video recorder according to claim 2, in which the material identifying code and the sequence position indicator are stored in respective subsets of the user-definable bits of the linear track timecode.
20
4. A video recorder according to any one of the preceding claims, in which the material identifying code is a code which uniquely defines the material amongst other material items stored on the same medium.
- 25 5. A video recorder according to claim 4, in which the material identifying code is an SMPTE UMID.
6. A recording medium format for recording video and audio material together with a timecode having a plurality of user-definable data bits; a subset of the user-definable data
30 bits of the timecode storing a material identifying code so that each instance of the material identifying code extends over the timecode user bits corresponding to an ordered sequence of more than one frame of the video material, a further subset of the user-definable bits of the timecode for each frame storing a sequence position indicator, indicative of the position of the current frame in the ordered sequence.

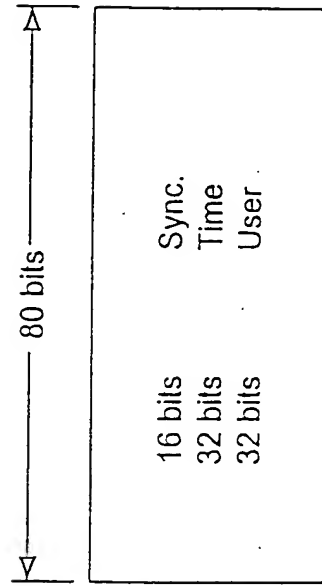
7. A recording medium having recorded thereon video and audio material together with a timecode having a plurality of user-definable data bits; a subset of the user-definable data bits of the timecode storing a material identifying code so that each instance of the material identifying code extends over the timecode user bits corresponding to an ordered sequence of more than one frame of the video material, a further subset of the user-definable bits of the timecode for each frame storing a sequence position indicator, indicative of the position of the current frame in the ordered sequence.
8. A video recording method in which video and audio material together with a timecode having a plurality of user-definable data bits are recorded on a recording medium; the method comprising the steps of:
- recording a material identifying code in a subset of the user-definable bits of the timecode so that each instance of the material identifying code extends over the timecode user bits corresponding to an ordered sequence of more than one frame of the video material; and
 - recording in a further subset of the user-definable bits of the timecode for each frame a sequence position indicator, indicative of the position of the current frame in the ordered sequence.
9. A video recording method substantially as hereinbefore described with reference to the accompanying drawings.
10. A recording medium substantially as hereinbefore described with reference to the accompanying drawings.
11. A video recorder substantially as hereinbefore described with reference to the accompanying drawings.

ABSTRACTVIDEO RECORDING

5 A video recorder operable to record video and audio material together with a
timecode having a plurality of user-definable data bits, is operable to store a material
identifying code in a subset of the user-definable bits of the timecode so that each instance
of the material identifying code extends over the timecode user bits corresponding to an
ordered sequence of more than one frame of the video material, the recorder also
10 recording in a further subset of the user-definable bits of the timecode for each frame a
sequence position indicator, indicative of the position of the current frame in the ordered
sequence.

Figure 5.

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Time Code.

Fig. 2

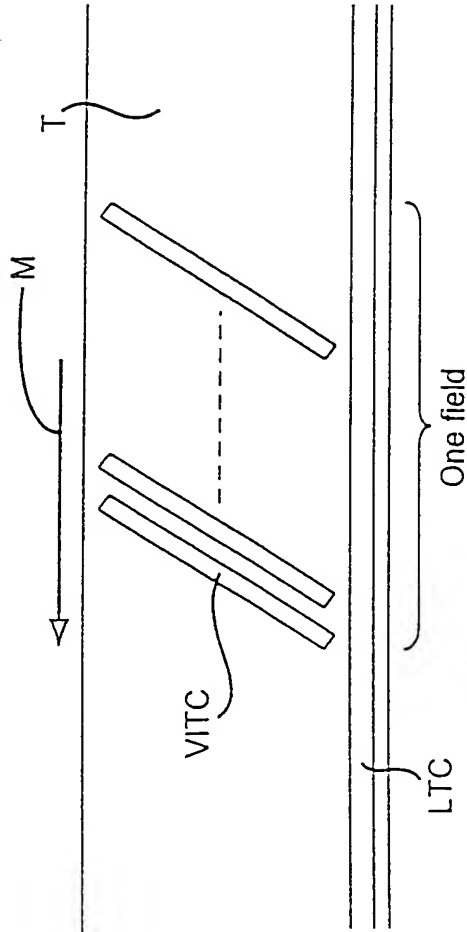


Fig. 1

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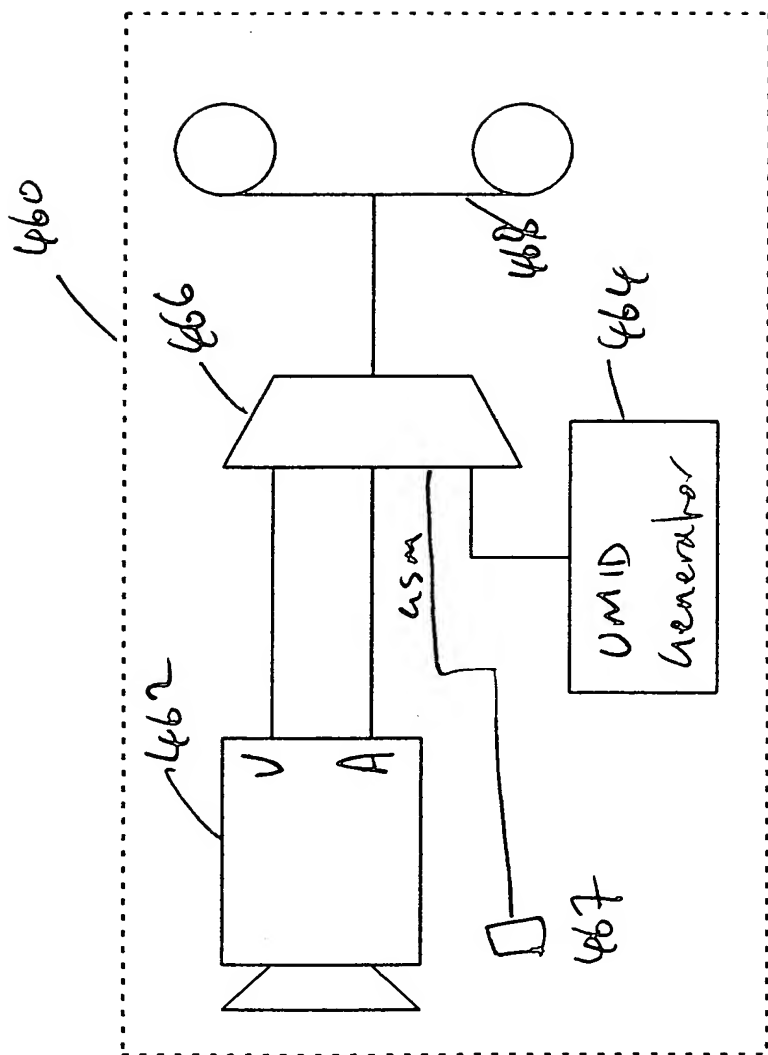


Fig. 3

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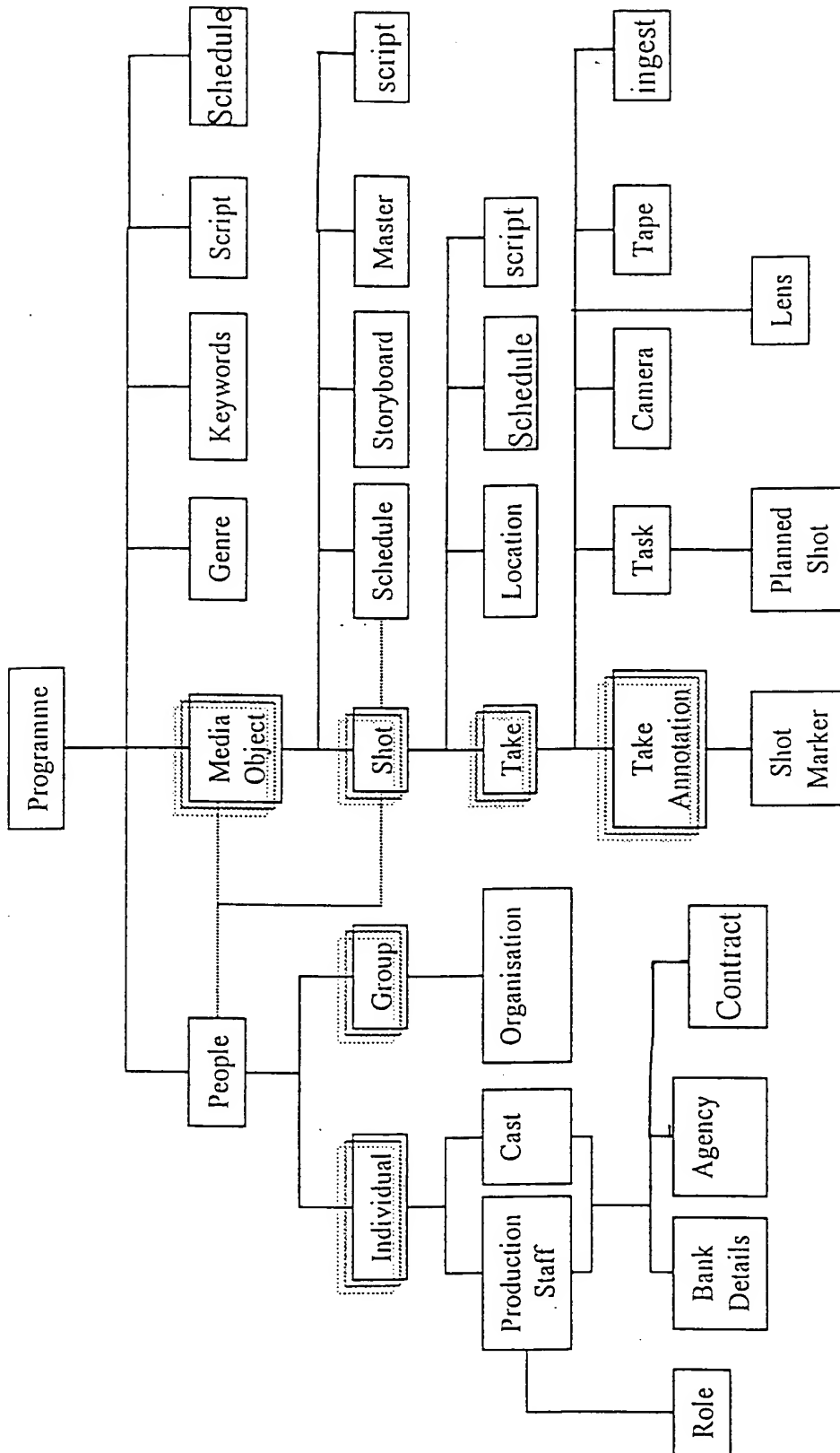
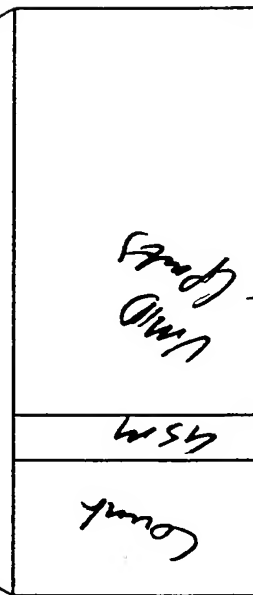
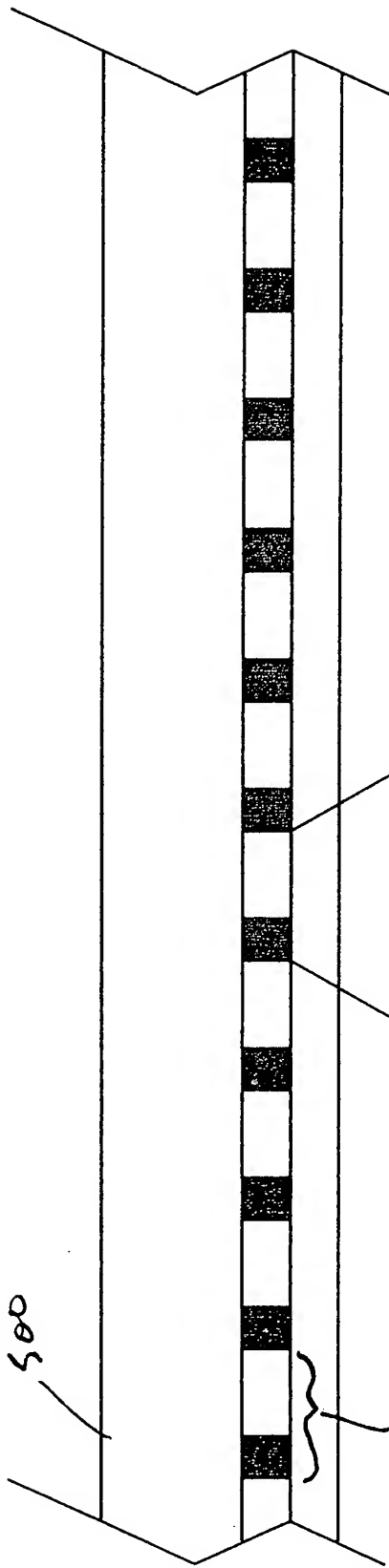


Figure 34

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→ 015

005

005

005

Fig. 5

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